VOL. 13, No. 6 JUNE, 1936

Medical Library
610.
A5
J86
065
v.13
no.6

The AMERICAN JOURNAL of OPTOMETRY

EDITORS

CAREL C. KOCH JACK I. KURTZ

COLLABORATORS

E. B. ALEXANDER, *Duncan, Okla.*
EARL ALLGAIER, *Ames, Iowa*
J. FRED ANDREAE, *Baltimore, Md.*
J. O. BAXTER, JR., *New Bern, N. C.*
J. O. BAXTER, SR., *New Bern, N. C.*
L. L. BEACHER, *New York, N. Y.*
ROBT. T. BEST, *Fairmont, Minn.*
W. I. BROWN, *New Bedford, Mass.*
J. T. CAMPBELL, *Washington, N. C.*
BRANT CLARK, *Los Angeles, Calif.*
J. ROBINSON COHEN, *New York, N. Y.*
PAUL DILL, *Greeley, Colo.*
HOWARD C. DOANE, *Boston, Mass.*
J. H. DRAKEFORD, *New York, N. Y.*
G. L. DUPLESSIS, *Minneapolis, Minn.*
T. H. EAMES, *West Somerville, Mass*
WM. FEINBLOOM, *New York, N. Y.*
L. P. FOLSOM, *South Royalton, Vt.*
HARRY LEE FORDING, *Portland, Ore.*
F. W. FREEMAN, *Anderson, Ind.*
M. GILBERT, *Owosso, Mich.*
W. H. GLAZER, *Philadelphia, Pa.*
R. M. HALL, *Cleveland, Ohio*
C. J. HATHAWAY, *Pontiac, Mich.*
C. K. HAYNES, *Jamestown, N. Y.*
NORMAN B. HAYS, *Niagra Falls, N. Y.*
W. JEROME HEATHER, *Chicago, Ill.*
A. E. HOARE, *Los Angeles, Calif.*
H. S. HORTON, *Cleveland, Ohio*
E. E. HOTALING, *New York, N. Y.*
CHARLES E. JAECKLE, *Newark, N. J.*
C. H. JOHNSON, *Philadelphia, Pa.*
H. D. JUDD, *Detroit, Mich.*
B. E. KEHL, *St. Louis, Mo.*
L. H. KRASKIN, *Washington, D. C.*
ALVHH R. LAUER, *Ames, Iowa*
C. V. LYONS, *San Francisco, Calif.*
G. A. MACELREE, JR., *Phila., Pa.*
F. L. MASON, *Berkley, Calif.*
D. J. MAYER, *Riverside, Calif.*
O. L. MCCULLOCH, *Holyoke, Mass.*
F. MCFADDEN, *Rutland, Vt.*
O. J. MELVIN, *Omaha, Nebr.*
WILLIAM B. NEEDLES, *Chicago, Ill.*
J. C. NEILL, *Philadelphia, Pa.*
J. F. NEUMUELLER, *Woodbury Heights, N. J.*
GEO. D. OERTEL, *Syracuse, N. Y.*
G. O. OHLSSON, *Detroit, Mich.*
C. R. PADELFORD, *Fall River, Mass.*
D. R. PAINE, *Topeka, Kansas*
J. I. PASCAL, *New York, N. Y.*
R. J. PEARCE, *Greensboro, N. C.*
R. M. PECKHAM, *Rochester, N. Y.*
GEO. A. PERKINS, *Ord, Nebr.*
ERNEST PETRY, *Rochester, N. Y.*
HARRY E. PINE, *Chicago, Ill.*
S. H. ROBINSON, *Prescott, Ariz.*
E. LEROY RYER, *New York, N. Y.*
H. LESLIE SALOV, *Newark, N. J.*
Z. J. SCHOEN, *University, Viriginia*
CHARLES SHEARD, *Rochester, Minn.*
CARL SHEPHARD, *Chicago, Ill.*
R. E. SIMPSON, *Pasadena, Calif.*
WILLIAM SMITH, *Dorchester, Mass.*
H. RILEY SPITLER, *Eaton, Ohio*
M. STEINFELD, *Paducah, Ky.*
EDWIN F. TAIT, *Philadelphia, Pa.*
WILLIAM J. TAIT, *Philadelphia, Pa.*
W. O. VIVIAN, *Media, Pa.*
R. N. WALKER, *Winston-Salem, N. C.*
A. P. WHEELOCK, *Des Moines, Iowa*
A. WHITAKER, JR., *Bridgetown, N. J.*
E. G. WISEMAN, *Buffalo, N. Y.*
ARENE T. WRAY, *Los Angeles, Calif.*
LLOYD K. WYATT, *Peoria, Ill.*

Published Monthly by the AMERICAN JOURNAL OF OPTOMETRY PUBLISHING ASSOCIATION,
1501 Foshay Tower, 821 Marquette Ave., Minneapolis, Minn.

ANNUAL SUBSCRIPTION $4.00. CANADA $4.50, FOREIGN $5.00.
Single Copies, 50c.

Entered as second-class matter February 20, 1924, at the postoffice at Minneapolis, Minnesota, under the Act of March 3, 1879.

UNIVERSITY OF MICHIGAN
MEDICAL LIBRARY

ADD COMFORT

Soft-Lite adds more than safe, scientific glare protection to the prescription. It increases the effectiveness of your Rx by including "comfort"—neutral absorption and reduction of all the visible rays. Soft-Lite Lenses tone down excess light, or glare, for "effortless" seeing.

Soft-Lite Lenses

SOFT-LITE LENS COMPANY, INC.

SOFT-LITE LENSES FOR COMFORT

AMERICAN JOURNAL OF OPTOMETRY

Vol. 13 JUNE, 1936 No. 6

CONTENTS

ORIGINAL PAPERS

An Experimental Study of Glare Susceptibility. A. R. Lauer . . 200

The Diagnosis of Fici of Infection by Chromography. Donald J. Mayer 208

The Problem of Amblyopia. R. M. Hall 227

EDITORIALS

The Optometrist's Part in the Prevention of Blindness. C. C. Koch 232

SPECIAL REPORT

The Optometric Research Institute of Michigan to Concentrate on the Investigation of the Relation of Vision to Scholarship. R. M. Peckham 237

BOOK NOTICES

The Extra-Ocular Muscles. Luther C. Peter 238

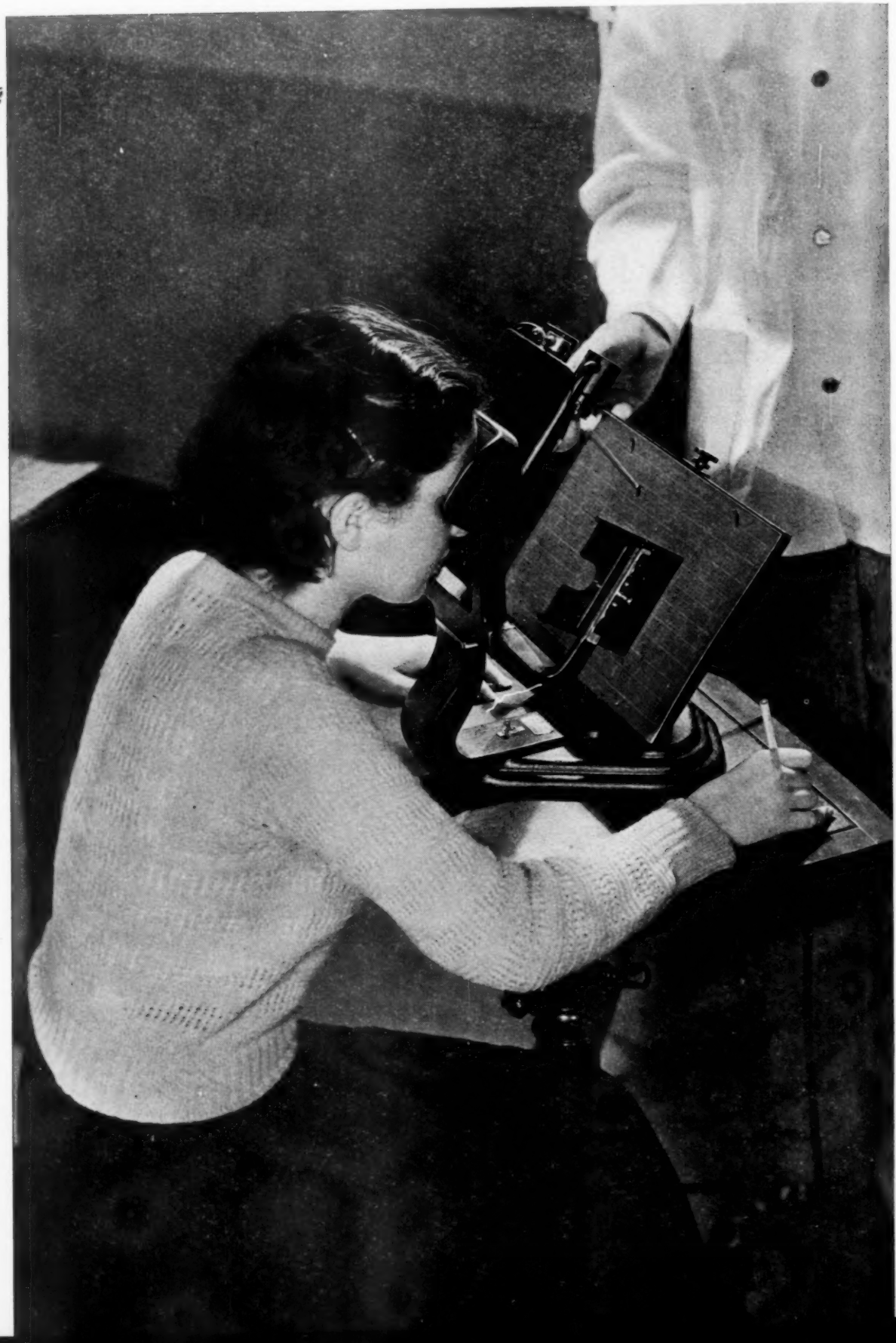
ABSTRACTS

The Equalization of the Retinal Image Sizes. W. B. Barker . . . 239

Some Simple Corrections in Sub-normal Vision. G. Henry Aronsfeld 240

Amblyopia—A Case Report. Edward Widdell 240

DESIGNED TO SOLVE



AMERICAN JOURNAL OF OPTOMETRY

Vol. 13 JUNE, 1936 No. 6

AN EXPERIMENTAL STUDY OF GLARE SUSCEPTIBILITY*

A. R. Lauer, Ph.D.
Associate Professor of Psychology
Iowa State College
Ames, Iowa

The Problem

The problem of automobile headlight glare is a much debated matter although few experimental studies have been carried out. There are so many factors involved that the exact nature of the problem has been obscured. Miller (1928) has shown that headlights vary from 1.2 foot candles to .005 foot candles at a distance of 100 feet from the light, depending upon the angle and type of lens used. It is the purpose of this paper to discuss only those factors which have been measured and their relationships determined.

Luckiesh (1931) has defined glare as "the undesirable effect produced by light entering the eye directly from any brightness other than that of the object to be seen." It is also known that extraneous light in the periphery does not affect vision as much as in the macular field. Further, the upper part of the retina is more sensitive to glare than the lower part of the retina. That there is a compensatory effect for the level of illumination was shown by Lauer (1933).

There are two general methods of measuring glare. One is to present a certain auxiliary light stimulus and have the subject report as to the degree of unpleasantness or discomfort. The other is to ask the subject to report the visibility or legibility of a given test object under certain lighting conditions. Two methods of varying the brightness-ratio between the source and its background have been used. One is to increase the amount of the glare-source until a visibility threshold is reached. The other is to increase the illumination on a test object until the object becomes visible, followed by a reversal of this procedure. A reversal of the first method cannot be used, since the intensity of the glare-source tends to fatigue the eye very rapidly.

*This study was made possible through grants from the American Optometric Association for the purpose of determining the visual limitations of drivers. Submitted for publication May 18, 1936.

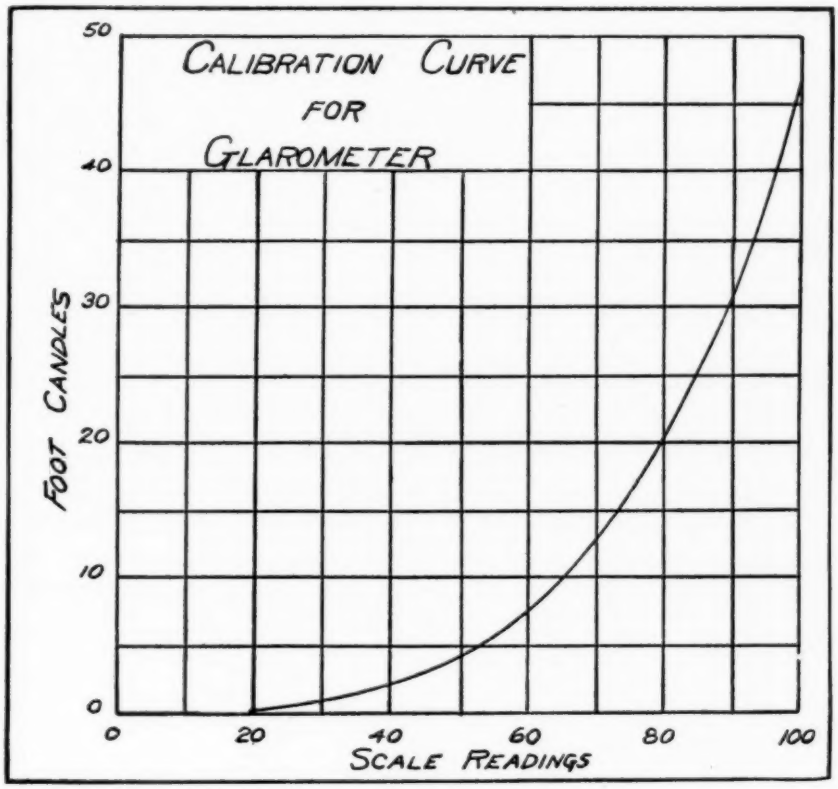
The present study was in essence a standardization of the first procedure described and the establishment of relationships between age, visual acuity, and susceptibility to glare. The Glarometer shown in figure 1 was used in measurements of 1014 commercial drivers during the summer of 1935. The studies were made in five states and represent a fair cross-section of the adult male population.

Figure 1
Showing Glarometer as used in these experiments. The cloth used to screen out extraneous light was not a part of the regular equipment of the instrument.

The instrument comes without the curtain shown in the illustration. Since this photograph was taken we have devised a cone-shape scope to take the place of the cloth. A ground-glass background is flooded with light from a strong bulb placed behind it and a large diffusing lens to equalize the illumination. A small opaque card is fastened on the ground-glass with the word out printed large enough to be legible to anyone with vision of about 35 per cent or better. The rheostat control is used to increase the illumination behind the ground-glass. Four trials are usually made. When the subject fails to read the word he calls out. The rheostat reading is taken and the light switch turned off. The scale is calibrated in linear units from 0-95, which translated into light units at the subject's eye varies from 0-38 foot candles. This

relationship is shown in curve 1. The amount of light falling on the test object is approximately 2 foot candles and is supplied by a special candalabra bulb placed behind a frosted diffusing glass.

The reliability of the test, using the 1st and 4th trials correlated with the 2nd and 3rd trials, is +.98. Some variation takes place from one time to another and it seems the reliability will be slightly lower



Curve 1
Foot candles af light at patients eye.

when using retest technique. However, the subjectivity of the examination does not lower the reliability but there are apparent changes in the organism which do affect retest scores.

The brightness factor of the test object and background is approximately 1.2 millilamberts at the lower end of the scale. Because of reflected light, the brightness probably raises to double this amount as the light is increased although no satisfactory method of measuring the latter has been devised. A suitable measuring instrument is so large as to obscure the light source.

Since the test process is very short—not to exceed four seconds—the pupillary change in size would not be very great. The photon ratio of the background-test object varied from about 1:2 to 1:86 between individuals.

Results

The results described below were obtained from a series of experiments made in the laboratory and by field studies of the driving clinic described by Lauer (1935) in this Journal.

Series 1.

By correlating the scores obtained on age, visual acuity, and glare the following relationships were obtained as shown in table I.

Table I.

Zero order correlations.

	Glare	Visual acuity
Age	—.4986	—.2649
Visual Acuity	+.6235	

Partial correlations

$r_{gv.a}$	+.5879
$r_{ag.v}$	—.4423

From this table it is clear that the susceptibility to glare is closely associated with age and visual acuity. The partial correlations show the effect of visual acuity and age on glare-susceptibility, independent of the influence of the other variables considered. The negative relationship between visual acuity and age was found in spite of the possibility of presbyopia of older subjects. Most of the subjects were hardly old enough to cause any great effect in this way, however.

Series 2.

The results shown in table II may be used as norms for adult male subjects using the Glarometer technique as described in this paper. They are typical of industrial workers in most occupations of an outdoor nature.

Table II.

Distribution of 1014 adult male subjects on Glarometer measurements.*

Per cent of drivers	Scale readings	Foot candles at eye	Foot candles at ground glass	Photon contrast (approx.)
5	14-35	mn. 1.0	2.78	1:2
10	36-47	mn. 2.5	6.95	1:7
20	48-55	mn. 4.2	11.67	1:12
30	56-61	mn. 7.0	19.46	1:20
20	62-68	mn. 10.0	27.80	1:28
10	69-74	mn. 15.0	41.70	1:42
5	75 and above	mn. 22.0	61.16	1:61

*Eye adapted for photopic vision.

Besides the standards, which may be used for comparative purposes, the table shows the enormous difference in susceptibility to glare of average drivers.

Series 3.

There has been some question as to whether the size of the letters on the opaque card used on the ground-glass affect the readings made on the Glarometer. Accordingly an experiment was set up in the laboratory to determine the magnitude of such effects. A larger word stop was printed in dark blue on white and placed on the ground-glass. Another word on was printed in white on a black background. Seven subjects were used and the sum of four readings averaged for the results given in table III.

Table III.

Showing effect of size of letters on readings of Glarometer.

	Out	*Stop*	*On*
	Mean	Mean	Mean
N	61.75	78.75	89.50
W	67.25	80.00	90.50
L	61.75	78.75	89.50
B	75.50	80.75	91.75
Q	85.00	91.50	91.25
H	72.25	86.25	95.00
La	67.25	73.00	74.40
Total	490.75	569.00	621.90
Mean	70.11	81.29	88.84
	White background black letters letter angle 10′	white background blue letters letter angle 2° 30′	black background white letters letter angle 2° 30″

In all cases the order of magnitude was the same with the exception of stop and on for subject Q. These readings were near the upper limit of the scale as Q was able to withstand considerable glare without being blinded.

Series 4.

Another problem related to the effect of measuring glare susceptibility with the eye adapted to different amounts of light. This problem is highly important to practitioners or licensing bureaus. Will a person measured on a dark day stand more or less light than if measured on a bright day?

Two experiments were run. The first was a study of the effects of three conditions of adaptation; (a) normal lighting of 4-6 foot candles, (b) after 5 minutes in a darkened booth, and (c) adapted to high illumination. The subject was caused to gaze through a window

at the northern sky for a period of 10 minutes. Light coming through the window was measured and found to be between 45 and 80 foot candles. Results are given in table V.

Table V.

Effects of adaptation on Glarometer readings.

		Illumination Mean of two scale readings.		
		A	B	C
Subject	Time between measurements	4-6 ft. candles	dark adapted. 5 min.	adapted to high illumination
R	A and B 5 min.	70	72.0	(no data)
		69	72.5	73.5
L	A and B 1 day	50.5	(no data)	(no data)
		37.3	37.5	52.5
H	(No data)	75	73.5	84.0
D	A and B 10 min.	55	46.0	(no data)
B	A and B 10 min.	63	56.0	"
J	A and B 10 min.	68	57.5	"
Al	A and B 10 min.	63	67.0	"
An	(No data)	59.5	53.5	"
Average		61.1	66.9	70.0

The results while limited in number of cases do not bear out the theory that the dark adapted eye is more sensitive to light as measured by the Glarometer. One case, measured on different days, shows some variation from one day to the next. The exact cause of this variation has not been established. The pupillary size does not seem to account for the difference noted as comparisons between the dark adapted and the light adapted eye vary in same directions from the eye adapted to normal light.

The second experiment was performed with another type of glare measuring devices such as described by De Silva (1936). The subjects were measured under conditions of ordinary light and after 5 minutes adaptation in a dark booth. The results are shown in table V. The values are those used on the glare test apparatus of De Silva.

Table IV.

Effect of dark adaptation on readings of the glarometer.

Dark adapted		Light adapted
Mean 6.63		Mean 6.41
	Diff. .22	
	S. D. diff. .65	
	Critical ratio .35	

No significant difference is shown here for scotopic vision.

Definitions of terms used

Foot candle: Amount of light given off by a standard candle at 1 foot distance.

Millilambert: Brightness of a surface of 80 per cent reflection-factor receiving an illumination of 1.16 foot candles.

Photon: Intensity which accompanies an object of brightness of 1 candle per sq. meter and an effective pupillary area of 1 sq. mm. (To measure the physiological intensity of the visual stimulus.)

Correlation: The degree of relationship between two different measurements. +1.00 is perfect agreement 0.00 is no relationship and —1.00 is an inverse relationship. Any intermediate value indicates the amount of relationship.

S. D. of the difference: The amount of difference between means of measurements made which might occur one out of three times by chance. Called standard deviation of the difference.

Critical ratio: Number of times the S. D. of the difference goes into the difference between means. This should be 2.5 to be significant.

Reliability: The consistency of measurement. Will a second measure give the same results?

Validity: The realness or truth of the test. Does it measure actual susceptibility to glare on the highway?

General Summary

From these tables it appears that adaptation does not noticeably affect readings on either the Glarometer or the De Silva apparatus within the limits of the conditions described in these experiments.

The validity of the instruments was not studied although the reliability of either method is quite satisfactory if taken on the same day. Further studies need to be made of the effect of time of day, fatigue, health, etc. The correlation between the two methods was +.41 which indicates a fair degree of correspondence between them.

Summary and Conclusions

Based upon the calculations from this set of observations the following conclusions may be offered:

1. The reliability of tests of the susceptibility to glare are quite satisfactory.

2. Subjects with inferior vision are much more susceptible to effects of glare on legibility than those of normal vision.

3. Older subjects are more susceptible to glare than younger subjects. The relationship seems linear. Good vision does not guarantee low susceptibility to glare effects.

4. The individual subjects studied varied enormously in their susceptibility to glare. This ranged from a 1:2 ratio of background to legend to a 1:86 ratio.

5. The correlation of two measures of susceptibility to glare correlate —.41. Since one of the tests involved a criterion of legibility and the other visibility, the actual relationship is thought to be higher, as measures of acuity of vision for the two possible measurements showed a correlation of but +.29.

6. There seems to be little difference between scotopic and photopic vision so far as susceptibility to glare is concerned at the level of measurement used in these studies. The sensitivity of the eye to glare at night is due to brightness ratio differences rather than to adaptation of the eye.

DR. A. R. LAUER
DEPARTMENT OF PHYCHOLOGY
IOWA STATE COLLEGE
AMES, IOWA

REFERENCES

De Silva, H. R., On an investigation of driving skill. The Human Factor. 10, No. 1; 1-13. 1936.

Lauer, A. R., Lighting conditions and other factors to be considered in the use of the Clason acuity meter. Amer. Jour. of Optometry. 10, No. 6; 194-200, 1933.

Lauer, A. R., A portable research clinic and its value. Amer. Jour. Optometry. 12 No. 3; 85-90. 1935.

Luckiesh, M. and Moss, F. K., Seeing. Chap. 12, 121-137. 1931.

Miller, R. D., Glare and light distribution from automobile headlighting devices. Master's Thesis. Iowa State College. 1928.

THE DIAGNOSIS OF FOCI OF INFECTION BY CHROMOGRAPHY*

Donald J. Mayer, O.D.
Riverside, Calif.

"Chromography has successfuly withstood the most severe tests of all, those made in the crucible of the clinic, and it demands its place as a part of every complete optometric diagnosis. Because of its frequency the recognition of foci of infection plays a large part in optometric diagnosis, and chromography makes the diagnosis of foci of infection positive." This is one of the concluding statements of a paper by the same title as the paper here presented that was published in the American Journal of Optometry (January, 1933) under my name.

This paper is a resume of seven years of clinical research in the field of Chromography, some of the results of which have been published in the American Journal of Optometry, January, 1933, April, 1934, and June, 1935.

Hayden, Rosenow, Lucas and House have established the fact that 80 per cent of all foci of infection is found in the head. There are 44 sources of infection in the head and 32 of them are the teeth. A much greater percentage than 80 per cent of all patients over 35 years of age showing foci of infection by chromography have some form of dental pathosis or oral infection as the main contributing cause of the infection. This is because of lowered resistance by natural metabolic changes. Therefore, it is obvious that after the chromographs reveal foci of infection and the extra ocular tests are completed along with the balance of the complete optometric diagnosis, the case is immediately referred to the oral surgeon for further diagnosis and attention.

The second group of cases showing foci of infection and second in importance in optometric diagnosis are cases of tonsilar origin. We would suspect the tonsils rather than the teeth to be the source of infection in all patients under 30 or 35 years of age and our chromographic evidence followed through confirms this statement.

Clinical analysis indicates that sinus infection is of far less importance than oral and tonsil infection. Follow through work in chromography definitely proves that the removal of oral infection in patients

*An abridgment of the material presented before the California Optometric Research Institute at Pasadena, California, April 8, 1936.

over 35 years of age raises resistance to a point of tolerance in the great majority of cases of foci of infection, and that sinus infection is secondary to oral infection is being proved by an ever increasingly strong chain of evidence. It is in these patients about 35 years of age or over that sinus infection becomes manifest and case after case subsides and apparently is entirely cleared up or at least resistance is raised so any existing disturbance of the sinuses is tolerated.

While 80 per cent of all foci of infection is found in the head there still exists a remainder of 20 per cent of these cases of infection which optometrically we may say make up all abdominal disturbances resulting in infection.

In the locality in which I practice, these abdominal disturbances resulting in infection are important factors to be reckoned with in the study of chromographic evidence of foci of infection. This is true in all localities where fresh green vegetables are easily obtained and eaten raw, but particularly in the parts of the country where these necessary vegetables are raised. Here those abdominal infections are many because of parasitic infection of the intestinal tract, especially amebic infection.

In a previous paper I mentioned the work being done by many of our modern authorities who are finding the intestinal tract to be the seat of a majority of all cases of foci of infection.

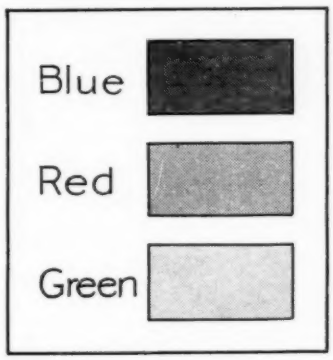
"The entire alimentary tract is a reservoir and laboratory of poison." (W. E. Kessinger, M.D.) I believe that if the intestinal tract is kept thoroughly cleansed and free from toxin then body tolerance or resistance to infection is raised so that the infections in other parts of the alimentary system and body are less severe and more easily cared for and removed; also it is more difficult for any toxic agent to lower resistance and gradually become a source of focal infection.

Therefore, I take no issue with these men endeavoring to prove the intestinal tract to be the original seat of foci of infection for it matters not which is the primary and which is the secondary infection if tolerance is reached and the chromographs are normal or toxic free.

I am excluding all foci of infection of the thoracic cavity for these patients having that type of infection are either aware of the infection or at least aware of some organic disturbance before coming to the optometric eye specialist for diagnosis. Further, the majority of these disturbances are beyond the scope of optometric diagnosis, and while all supportive functions of the eye effect vision, to date chromographic evidence of value in the recognition of disturbances and infections of the thoracic cavity I believe are nil.

The interpretation of blue field contraction I believe to be the most abused and most misleading portion of chromographic diagnosis if we follow the general conception of statements published regarding this field of chroma.

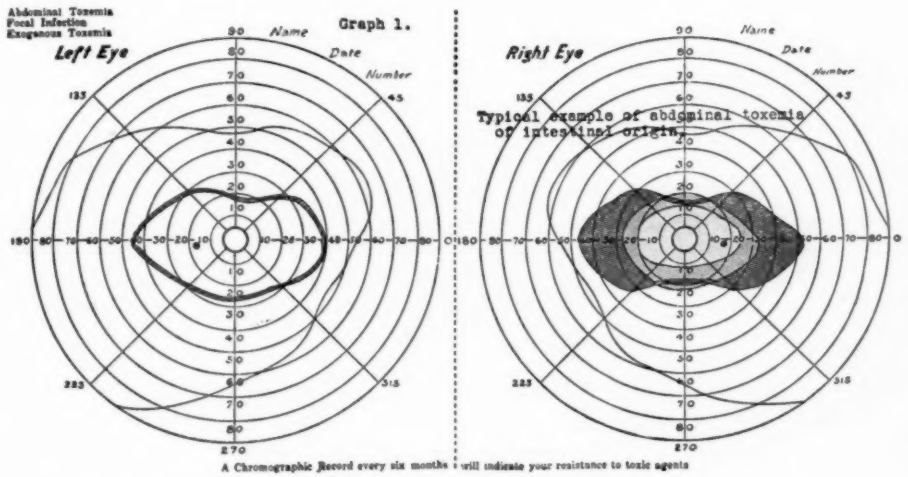
In a former paper I mentioned that blue field contraction denotes abdominal toxemia and that the blue field contracts first in the vertical meridian in abdominal toxemia of eliminative origin. Dr. Russel Simpson noted changes in the blue field in cases of constipation in 1924.



Color Key to Graphs

Today I have several hundred more cases of clinical evidence as further proof of that statement.

In cases of abdominal toxemia of intestinal origin, the blue field contracts and contracts more rapidly in the vertical meridian with the resultant effect of a field shaped as a peanut, or lima bean, but the most typical field of this kind is sway backed in both vertical extremities. (Graph 1 abdominal toxemia.)



As the toxemia becomes more severe, the red field contracts and as the condition progresses to focal infection the green field contracts.

When the green field reveals foci of infection and the red field is somewhere near the expected norm or slightly contracted and the blue field is small or partly missing (overlapped) then the case is one of foci of infection of abdominal origin and almost invariably the infection may be located in the intestinal tract.

When foci of infection breaks resistance entirely, all of the fields will eventually collapse so that they are well within the 15 degree circle, then our evidence is simply foci of infection and that focal infection is localized by the process of elimination, exclusion of optometric evidence, diagnosis by the oral surgeon, and then diagnosis by the diagnostician of internal medicine, or the physician and the abdominal specialist.

The foci of infection may be listed among those 80 per cent of all cases of foci of infection located above the neck and in the head or throat, or the infection may be found in that 20 per cent of cases of foci of infection of abdominal origin and found any place within the abdominal cavity, and may be functional or organic but probably functional.

Out of scores of these cases at the present time I have six of foci of infection of abdominal origin under my continuous observation, all of which are from intestinal ameba, and all six cases have been diagnosed within the past eight months. I have three follow through cases of mucus colitis that have been under observation since 1929.

One of these cases, that of Mrs. Simms, was presented in a former paper and is here repeated: (Graph 2, Fig. 1, 2 and 3.)

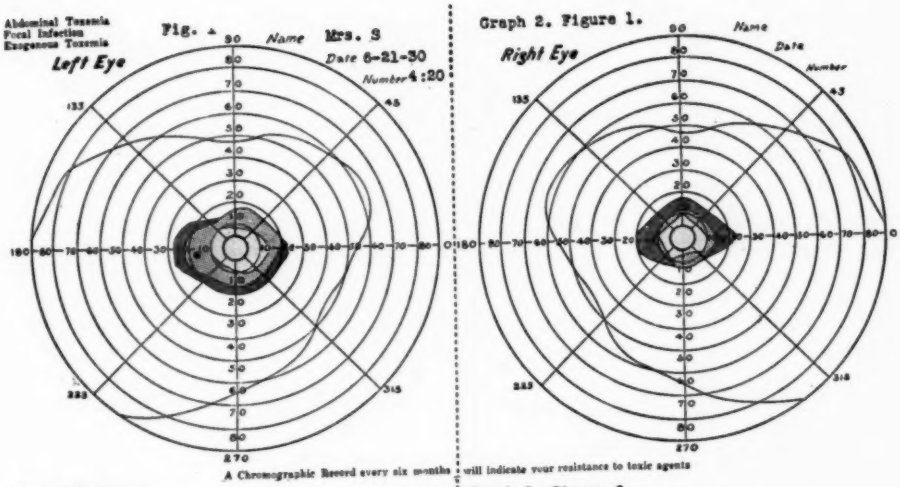
In June, 1929, a case was referred to me for ocular attention, the patient being the sister of one of the outstanding surgeons (M.D.) of this part of Southern California.

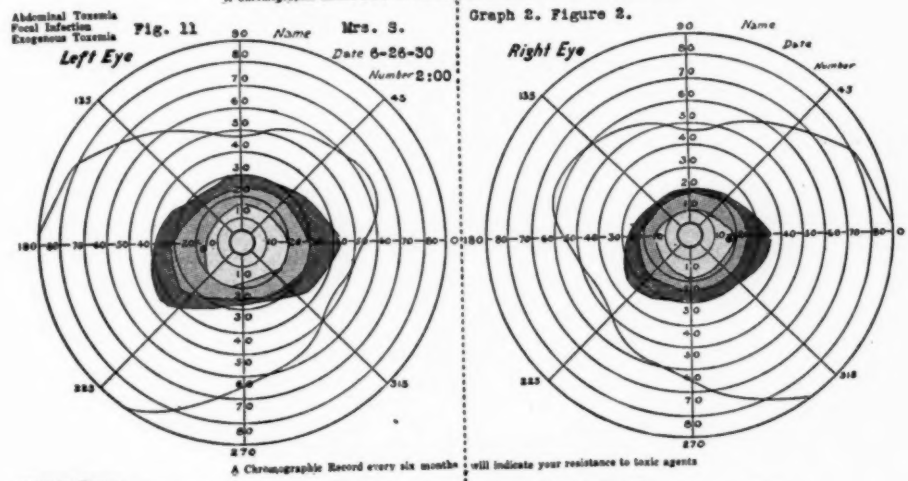
The patient, Mrs. S., could read only a few minutes at a time before her eyes pained her severely. The duration of this trouble had been over a period of about two or three months.

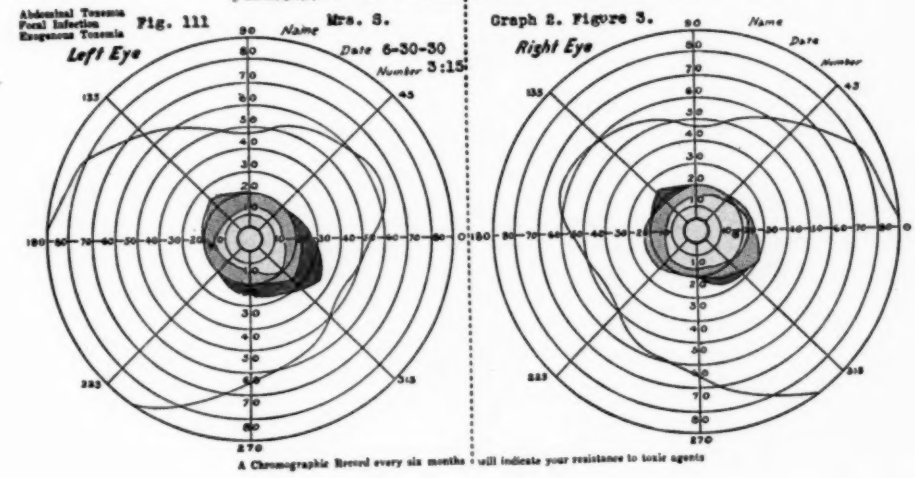
Examination showed that a slight change of lenses was needed, and the ductions showed an extremely low reversion to fusion. During the objective examination, the patient suffered greatly from photophobia and her eyes lacrimated badly.

The chromographic examinations resulted in a diagnosis of endogenous toxemia of the focal infection type, probably of abdominal origin. The patient was given a prescription for lenses and sent to her brother for general diagnosis. A report from the doctor stated that Mrs. S. was suffering from mucus colitis, and that proper treatment would be instituted at once.

Mrs. S. responded nicely to treatment, and her eyes improved greatly as her health improved. In June of 1930 Mrs. S. came to me for further ocular attention. At that time there seemed to be a return of former ocular symptoms.


Abdominal Toxemia
Focal Infection
Exogenous Toxemia
Fig. 1
Name Mrs. S
Date 6-21-30
Number 4:20
Left Eye
Graph 2. Figure 1.
Right Eye
Name
Date
Number
A Chromographic Record every six months will indicate your resistance to toxic agents


Abdominal Toxemia
Focal Infection
Exogenous Toxemia
Fig. 11
Name Mrs. S.
Date 6-26-30
Number 2:00
Left Eye
Graph 2. Figure 2.
Right Eye
Name
Date
Number
A Chromographic Record every six months will indicate your resistance to toxic agents


Abdominal Toxemia
Focal Infection
Exogenous Toxemia
Fig. 111
Name Mrs. S.
Date 6-30-30
Number 3:15
Left Eye
Graph 2. Figure 3.
Right Eye
Name
Date
Number
A Chromographic Record every six months will indicate your resistance to toxic agents

Examination revealed some change in the ocular condition over a year's time. The muscular system again was in bad condition, showing esophoria and a low induction. Both induction and plus convergence gave findings of a very poor reversion to fusion.

Chromographic examination revealed foci of infection more severe than that present the year before. Then the patient confessed that because of putrefaction, she had been advised against eating meat, fish, fowl, and eggs, but that she had been eating these types of foods forbidden by her brother in the diet he had outlined for her.

I then advised Mrs. S. to go without meat for five days. These instructions were followed and five days later the chromographs were almost normal. To demonstrate to the patient that she must follow her diet more closely, she was allowed to eat meat for four days after which time the charts were again taken. This third set of chromographs showed intestinal toxemia, and if the same regimen had been followed a while longer, the charts would have reverted back to the focal infection type as the first set of chromographs indicated.

After following her diet as outlined and not eating meat, etc., the fourth set of chromographs made about two and one-half months later showed the eyes to be toxic free.

The condition of the patient's eyes depends entirely upon her state of health. At times her eyes feel very comfortable and at those times the chromographic evidence is negative. At other times when her eyes bother greatly, the chromographic evidence indicates that the mucus colitis is beyond control.

Other tests were made on this patient for tolerance or intolerance to certain kinds of food (such as corn on the cob), but meat was the only food that seemed to greatly disagree with her.

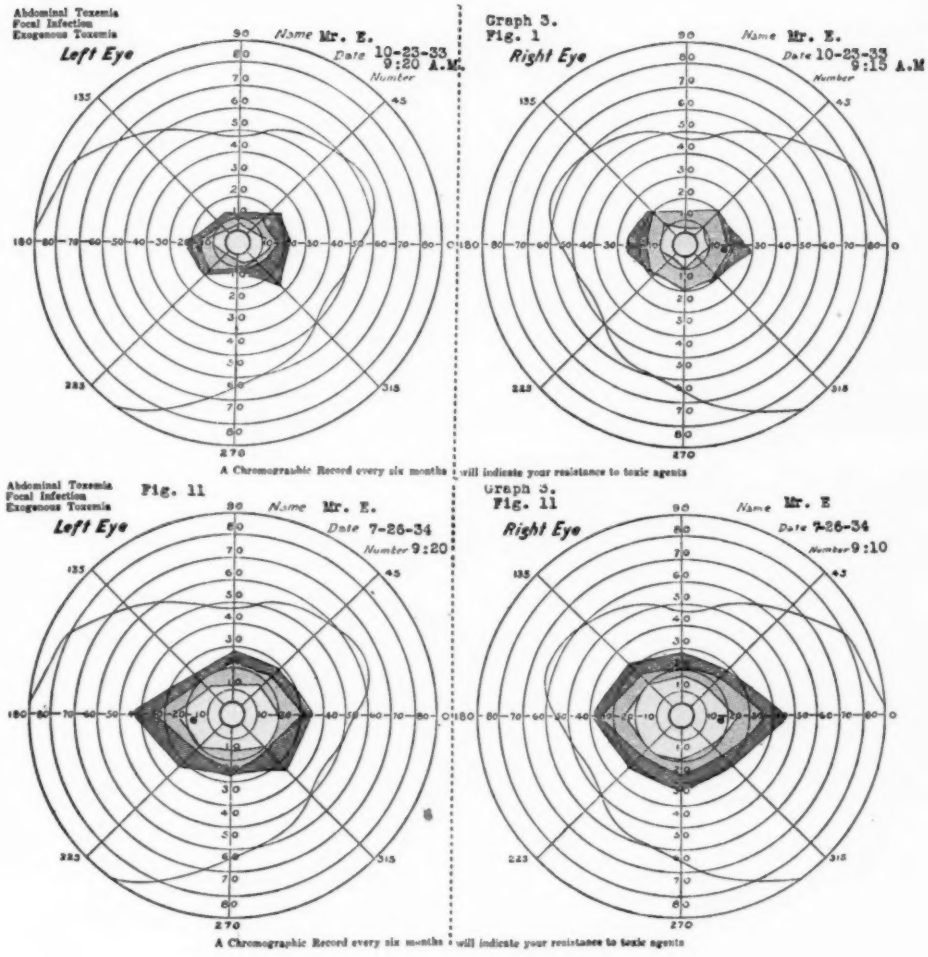
Ocular examination of Mrs. S. made in August of 1932 showed her eyes to be greatly improved and the mucus colitis controlled by following a rigid diet.

This case was further checked the first of this year with the same results.

An interesting case of amebic infection presented in a recent paper is here listed, that of Mr. Ekerhold. (Graph 3, Figs. 1 and 2.)

In October of 1933, a civil engineer was referred to me for optometric attention by a dentist. The case follows: Mr. E., age 50. History: Reads technical papers and studies about eight hours daily, finds that print blurs and cannot see well at distance with glasses which were prescribed by an oculist one year before coming to me. The glasses, single vision lenses, were to be worn all of the time. Eyes inflamed (both ocular and palpebral conjunctiva) most of the time, right eye generally worse.

Mr. E. had had this inflammation of the conjunctiva ever since completing some engineering work in Colombia in 1920. He had been



to many well known medical eye men, but no form of localized eye treatment had ever helped him.

The extra ocular tests were normal. The patient wore full dental plates (this work had just been completed about seven months before coming to me), sinuses clear, throat normal, blood pressure normal. The balance of the examination showed the habitual phoria and the induced phorias high, high exo at infinity but all ductions extremely low. The patient needed bifocal lenses and the physiological diagnosis showed toxic interference.

The chromographs revealed a focal infection type of graph, and because the dental diagnosis was negative by full mouth X-ray and the throat and sinuses appeared normal, Mr. E. was referred to a good general medical diagnostician who is an abdominal specialist.

Intestinal ameba were found and the patient was treated for this amebic infection for several months. In July of 1934, Mr. E. came in for check examination, including chromographs. The chromographic examination showed normal color fields and a tolerance to any remaining toxic disturbance. The conjunctiva were quite normal, and the patient said his eyes were less blood shot than they had been for fourteen years. The muscle balance and tonicity were much better, and Mr. E. had comfortable vision both for distance and near work.

Let us remember there is no primary ocular disease: any and all localized eye treatment of a medical nature is "patch up work," until and unless the source of the disturbance is removed.

Due to the fact that this patient had been treated by a number of medical men (all of whom enjoy splendid reputations) and had not been helped by them, any optometrist not doing chromographic work might have released this patient with new glasses and no further suggestion of professional attention to clear up the inflammation.

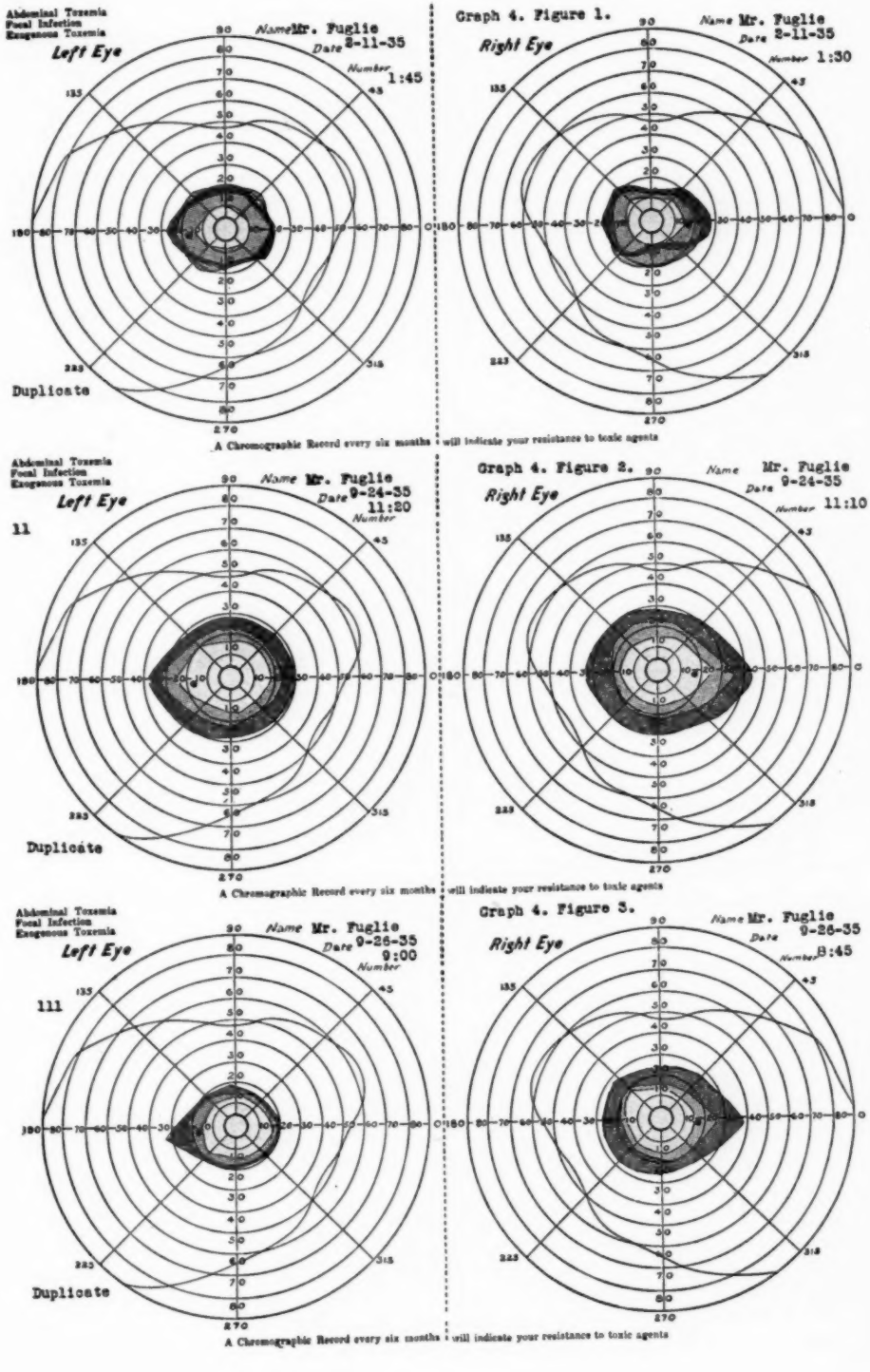
Here again chromography as a diagnostic aid, or a part of an analytical optometric examination was of great value, and the normal chromographs assured the patient an expected period of eye comfort and good resistance toward toxic agents affecting the health of the eye.

On February 11, 1935, a patient was referred by an oral surgeon. The patient also under the care of a very good medical physician who had diagnosed amebic infection had had all oral infection removed in an effort to raise resistance. The case follows: (Graph 4, Figs. 1, 2 and 3.)

Mr. C. N. Fuglie, age 24, electrical engineer: Symptoms: A severe headache in back of head most of time, unable to read only for a few minutes at a time for one and a half years. Most of trouble at near work but when working out doors has headaches all the time and intense photophobia. Had iritis two years ago and neuritis of shoulder several times each year. Eye trouble becoming more severe, had lenses changed five times in less than two years.

I found the sinuses clear under trans-illumination, throat irritated but clean, tonsils having been removed three years ago. The pupils very large, normal reaction to light, conjunctiva severely inflamed both eyes, palpebral conjunctiva greatly inflamed, ocular conjunctiva slightly inflamed. The case was a B_2 type with only a very partial chain of toxic interference. The patient was wearing minus lenses and now wears a plus on plus correction. When by chromography we find the graphs near a norm and the eyes toxic free the patient is quite comfortable, but when the chromographs show foci of infection, or abdominal toxemia then the visual graphs show suspenopsia and a low grade of depth perception and a field of fatigue.

Syntonic applications alleviate the headaches. Orthoptics take care of the suspenopsia, depth perception and the conditioning of the patient's eyes to a modern near point world, but the case can only be completed


Abdominal Toxemia
Focal Infection
Exogenous Toxemia
Left Eye
Name Mr. Fuglie
Date 8-11-35
Number 1:45
Duplicate
A Chromographic Record every six months will indicate your resistance to toxic agents
Graph 4. Figure 1.
Right Eye
Name Mr. Fuglie
Date 8-11-35
Number 1:30
Abdominal Toxemia
Focal Infection
Exogenous Toxemia
Left Eye
11
Name Mr. Fuglie
Date 9-24-35
Number 11:20
Duplicate
A Chromographic Record every six months will indicate your resistance to toxic agents
Graph 4. Figure 2.
Right Eye
Name Mr. Fuglie
Date 9-24-35
Number 11:10
Abdominal Toxemia
Focal Infection
Exogenous Toxemia
Left Eye
111
Name Mr. Fuglie
Date 9-26-35
Number 9:00
Duplicate
A Chromographic Record every six months will indicate your resistance to toxic agents
Graph 4. Figure 3.
Right Eye
Name Mr. Fuglie
Date 9-26-35
Number 8:45

when the amebic infection is cured and all abdominal toxemia removed so that the chromographs remain normal on recurrent charting over a period of time, then and only then, will the patient be able to expect continued eye comfort.

The damage done to the eyes by the former methods of ocular attention and the prescribing of minus lenses which were not at all indicated is problematical, certainly a continuation of that type of eye care would have thrown the patient into progressive myopia.

The contributing cause to this patient's ocular nervous and muscular imbalance is foci of infection. Mr. C. N. F.'s chromographs are here shown.

Re-examination December 29, 1935, revealed normal visual graphs and chromographs and Mr. Fuglie's nervousness has practically disappeared. He seldom has headaches and now reads and studies several hours at time without discomfort.

On March 10, 1934, Mrs. G. Z., age 35 (Graph 5, Figs. 1 and 2), was referred for optometric care. Case history; The patient had been under the care of a number of medical practitioners for the past five years. She was subject to colds, having six or eight severe colds every year. Had had maxillary sinus trouble for three years and had these sinuses washed out three or four times a year, also subject to sore throat. Eyes seem weary all the time, and sees angle worm spots before her eyes most of the time. After retiring at night sees lights in front of eyes for some time, thereby affecting sleep. Difficulty in looking down to go down steps and then seems to notice a film in front of right eye.

Mrs. Z. had been under the care of two medical eye men and was referred to them by an optometrist. Therefore, the optometrist was the first patch-up artist.

Analytical examination showed a C_1 type of case calling for more than the lens prescription given. Several pair of glasses had been prescribed, but no further ocular attention had been given or suggested.

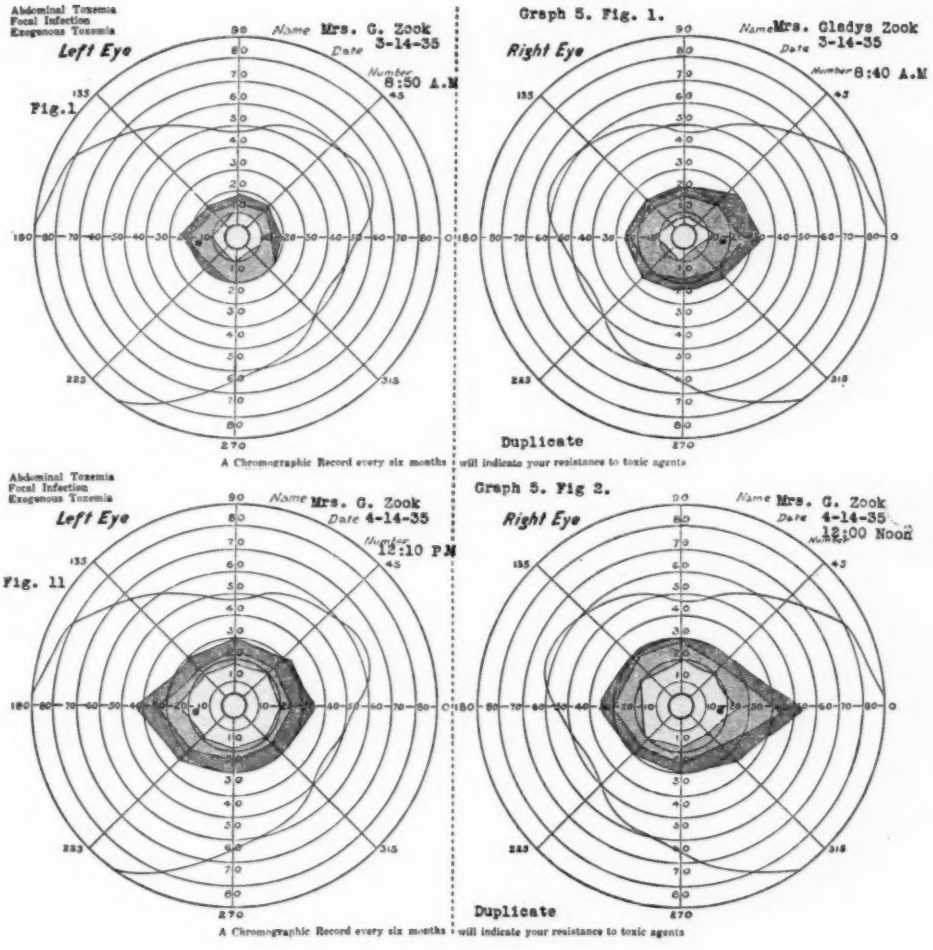
The chromographs show marked foci of infection. Extra ocular examination revealed fairly clear sinuses, a low grade inflammation of the right side of throat, normal blood pressure and a mouth needing prophylaxis. Mrs. Z. was referred to a very thorough and competent dentist for examination and dental attention.

Dr. Stevenson's report of examination and dental care follows:

Re: Mrs. Gladys Zook:

X-rays of Mrs. Zook show a slight pyorrhea condition throughout the mouth, with a very definite condition around the upper left molar area.

The lower right second molar showed a great amount of decay underneath the filling which forms direct communication with pulp chambers. After extraction the tooth was found to have chronic pul-



pitis. Upper right first bicuspid has been extracted and shows residual area.

I believe the main source of infection at this time is the lower right second molar, which has been extracted.

D. R. STEVENSON.

Immediately following this dental work, orthoptics were given by the Arneson and Updegrave techniques. One month later the chromographs were recorded and found to be normal. Re-examination of the eyes showed a visual graph quite normal.

The patient was informed that check examination of the eyes every four months was advisable and chromographs recorded every six months would give a positive index of her resistance to toxic agents, and the chromographs being normal, no toxemia or infection would be a contributing cause to ocular disturbance.

The chromographs recorded six months later were normal, and on April 16, 1935, when complete optometric examination was given the chromographs were still normal and very much the same as the second graph here shown.

Over a year and a half's time there has been absolutely no indication of recurrence of sinus trouble, and the throat seldom is sore. The eyes were again beginning to show fatigue and some muscae volintantes. Syntonics and orthoptics were instituted and satisfactory results have been obtained.

Re-examination December 28, 1935 found the patient well within the zone of ocular comfort, visual graphs and chromographs being normal.

Early in February of 1935, a young woman, 23 years of age, was referred with history as follows. This patient has just finished her education and training as a missionary and was ready to go out into the missionary field in a foreign country. The board of medical examiners had pronounced her physically fit for field work. They had told her that her eyes were causing no trouble and needed no attention.

Because of a lack of desire to do some necessary near work, a condition she had never had before, for she liked to study, some friends sent her to me.

Optometric diagnosis revealed a C_1 type of case with a chain of toxic interference. Chromography showed foci of infection. The patient was referred to the oral surgeon and two impacted third molars and a non-vital cuspid were removed. The chromographs showed an improvement but still revealed a lack of resistance. Another complete physical examination at my insistence resulted in a tonsillectomy.

Two weeks after the tonsillectomy chromography revealed normal graphs and good resistance. Orthoptics completed this case and now the patient is assured of eye comfort and safe in the knowledge that the foci of infection which would have continued to contribute to ocular discomfort, with the end result of ocular pathosis or a physical "crack up" has been alleviated.

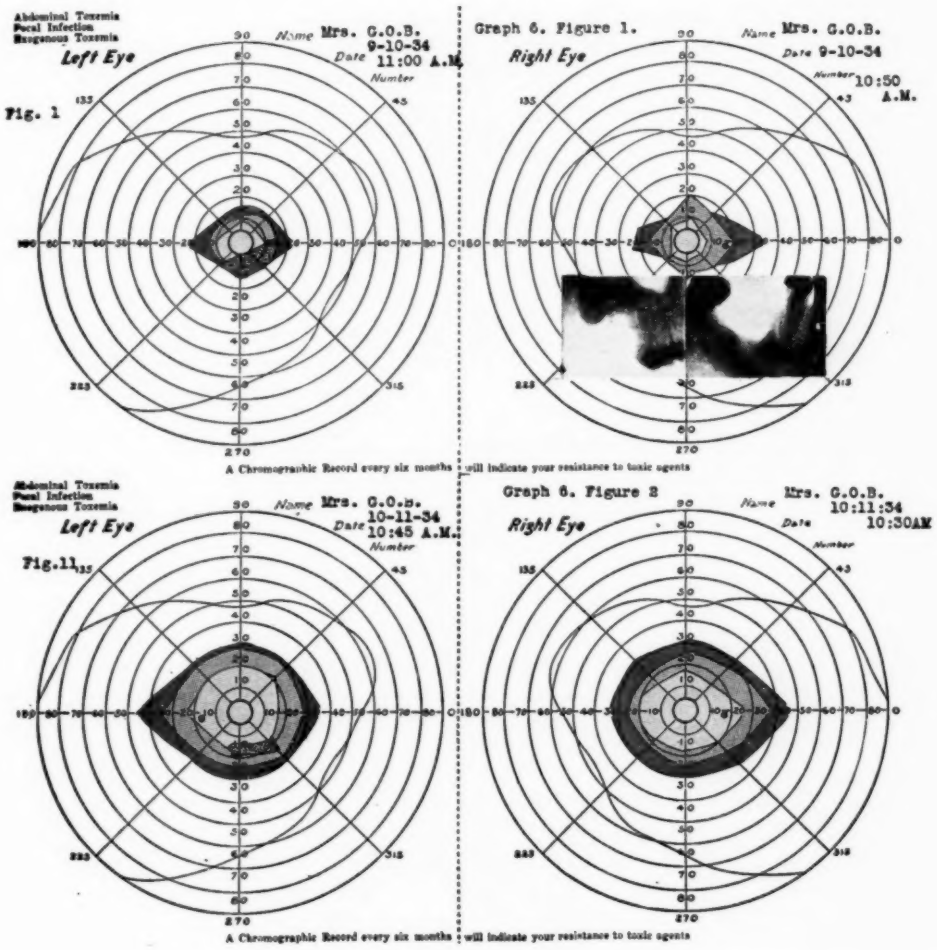
This patient has a history of poor health throughout her life. She seems a poor risk for foreign service and yet the medical board had pronounced her fit. I feel that her chances of health are greatly increased and her visual pattern is normal, so she has been released as a completed case and not a "patch-up job."

The following case would have been released with the prescription made in bifocals and the patient would have had ocular comfort, but during a period of time covering two years a great deal of damage would have been caused ending in partial destruction of the retinal tissue. Without chromography as a diagnostic aid this would have been a typical "patch-up job."

Patient Mrs. G. O. B., age 58. (Graph 6, Figs. 1 and 2.) History: Difficulty in reading of late, hard to thread needle. After reading ten or fifteen minutes letters run together. For past year has not had comfortable near vision, gradually becoming more difficult to do near work. Other than house work uses eyes in reading or sewing about four hours daily. Health has always been excellent.

The extra ocular tests show normal blood pressure, sinuses clear under trans-illumination, teeth need attention and mouth is affected by pyorrhea, but not appearing as a bad case, throat clear and normal. External ocular examination normal.

Following the 21-point examination of the foundation with a number of added tests, nothing was found or recorded showing a toxic interference. The case proved to be a simple B_2 type case calling for a bifocal correction.



Chromographs made at 11:00 A.M. and again at 4:30 P.M. revealed a severe focal infection. The graph of the right eye showed the green field well within the ten degree circle, the red field up 20°, down about 15° and the lateral measurements about 16° and 20°, only a part of the blue field was without the red field and that was laterally.

The graph of the left eye revealed greatly constrictd blue, red, and green fields with a large negative blind area as recorded.

In view of the history of excellent health and further because of the extra ocular examination showing needed dental attention, Mrs. B. was referred to the oral surgeon for full mouth X-ray and dental diagnosis.

As I have stated in a previous paper, 80 per cent of all focal infection is found in the head (Hayden, Rosenow, and Lucas) and a much greater percentage than 80 per cent of all patients over 35 years of age showing foci of infection by chromography have some form of dental pathosis or oral infection as the main contributing cause of the infection, therefore, it was obvious that this patient be referred to the oral surgeon.

The report of the diagnosis and the dental surgery completed by Dr. Housholder is here shown.

October 8, 1934.

Dr. Donald Mayer
Citizens Bank Bldg.
Riverside, California.

Dear Doctor Mayer:

Concerning Mrs. Boosey:

X-ray examination discloses horizontal reversed impaction of upper left third molar. Upper right second bicuspid and first molar are non-vital. Upper right second molar is missing and alveolar process greatly absorbed, leaving a food trap between first and third molars. Lower left first and second molar, edentulous with evidence of residual area in the bone.

The case was operated as follows:

Removal of impacted third molar. Surgical removal of upper right second bicuspid and molar and areas curetted. Upon opening the edentulous area of the lower left first and second molars a large cyst was found and removed and area thoroughly curetted. The incision was then closed with black silk sutures. The lower left second bicuspid, which had decayed to the point of pulp exposure, was also removed.

All remaining teeth proved vital under Cameron's galvanic test.

Sincerely yours,

F. L. HOUSHOLDER, D.D.S.

A series of chromographs were made upon completion of this dental oral surgery following the case through to complete recovery. The graphs made when I released Mrs. B. from my immediate care one month later revealed normal color fields, and the blind area smaller and farther away from central vision. That this scotoma definitely is somewhat more narrow in width and farther toward the periphery of the chromograph was recorded a number of times as the graphs were made after Dr. Housholder completed his work.

Now Mrs. B. will enjoy good comfortable vision and can feel assured that no toxemia present in her system is affecting her eyes, and that no further damage will be done to that delicate part of the eye that records vision. She understands that a chromographic record every six months will indicate her resistance to toxic agents.

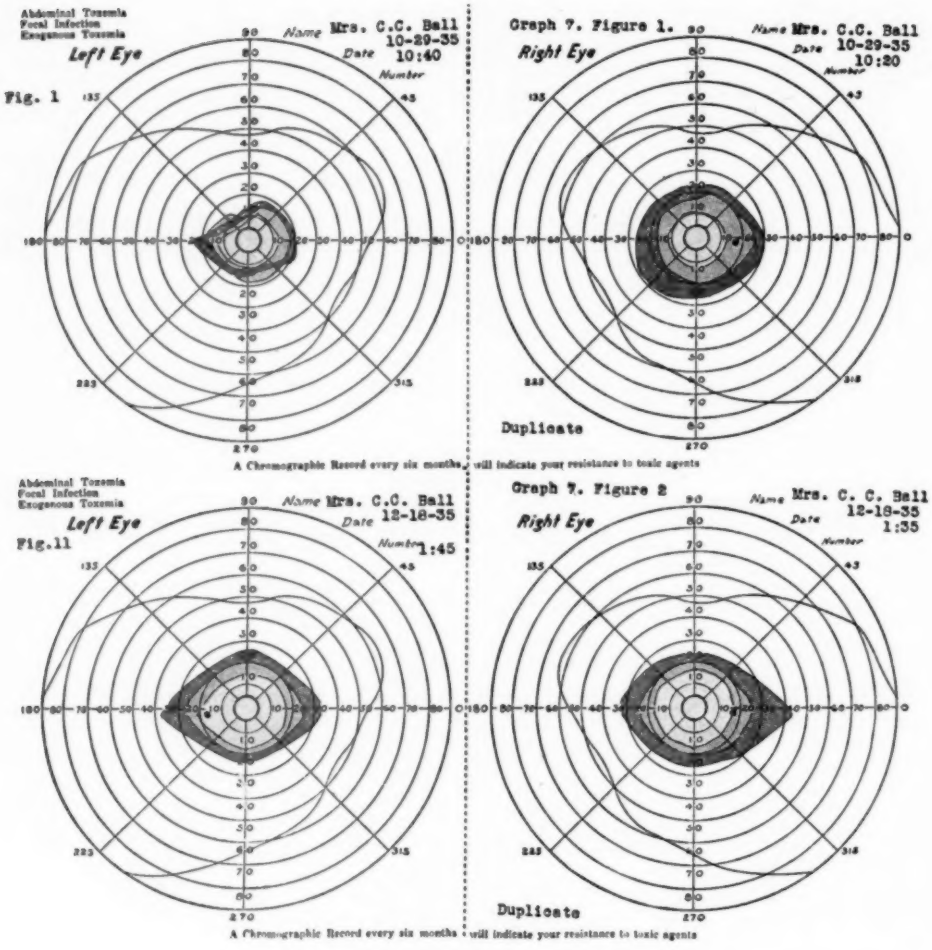
In November and December of 1935, ten patients were referred to me for chromographic examination. Seven of these cases revealed foci of infection, two abdominal toxemia and one showed foci of infection and abdominal toxemia. All ten cases were found to have ocular involvements causing symptoms of discomfort but were referred for chromographic evidence alone.

One of the cases Mrs. C. C. Ball, age 56 (Graph 7, Figs. 1 and 2), I had taken care of in 1933. From June of 1933 until September of 1935 she had had complete ocular comfort, although chromographic evidence at the time of optometric diagnosis showed a systemic toxemia with the tendency toward foci of infection.

Mrs. Ball resisted this incursion of infection for over two years but in October of 1935, she was referred to me for chromographic examination because of a severe lowering of resistance as a result of the influenza.

The chromographs (Mrs. C. C. Ball, Fig. I) showed foci of infection. Trans-illumination revealed evidence in 1933 of need of immediate dental attention, but the patient had not heeded my advice. Mrs. Ball was now referred to Dr. Housholder and his report is here given:

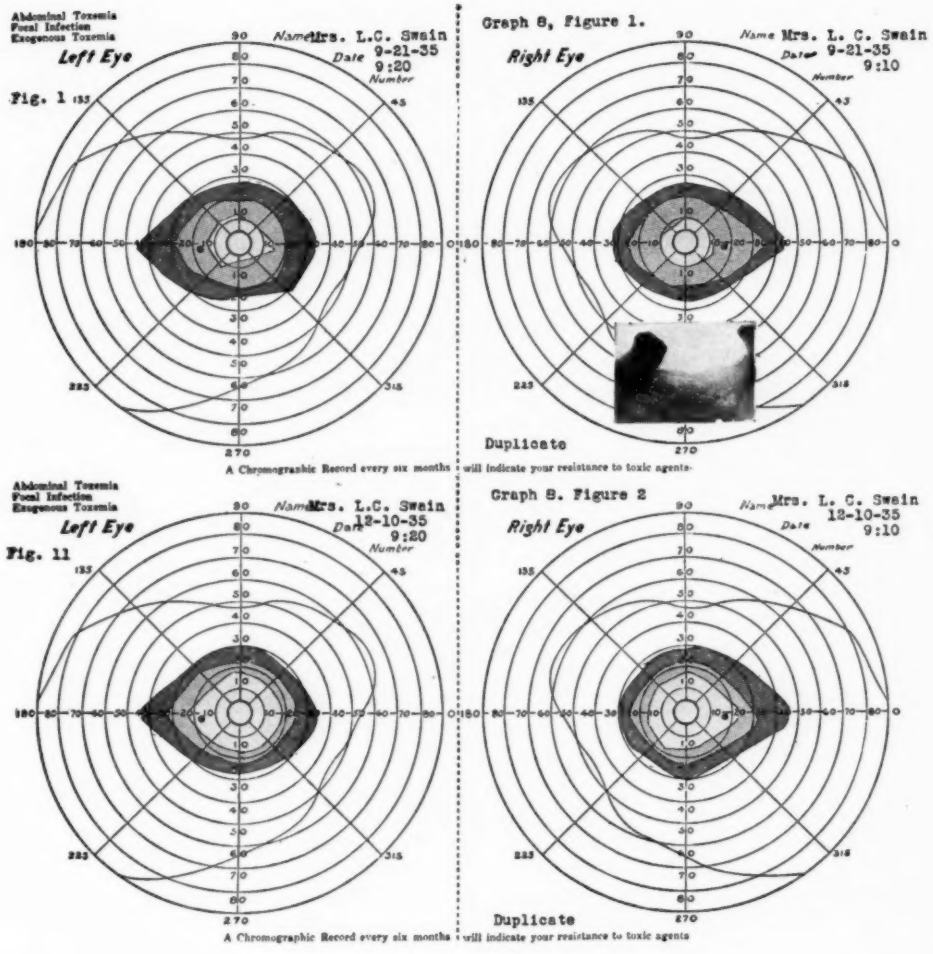
> Regarding Mrs. Clinton Ball:
> X-ray shows upper left first and second bicuspids non-vital with marked rarefied area at apex of both roots.
> Upper right first bicuspid non-vital with rarefication at apex.
> Healed in root of upper right second molar with condensation osteoitis.
> Lower left first molar non-vital and badly decayed with extensive rarefied area involving roots.
> Lower right third molar malposed producing food trap and 50 per cent destruction of supporting tissue.
> Mrs. Ball was operated as follows:
> All infected teeth and roots surgically removed and adjacent areas thoroughly curetted.
> Riverside, Calif. Signed F. L. HOUSHOLDER, D.D.S.
> Dec. 20, 1935.



The second chromograph (Mrs. Ball, Fig. 2) shows a normal type of graph. The patient is once again in good health. Her eyes no longer feel fatigue, but she has been advised to have a complete optometric examination at this time.

On November 27, 1932, Mrs. L. C. Swain (Graph 8, Figs. 1 and 2), was referred for optometric diagnosis by her son, Dr. Ray C. Swain. The chief complaint at that time being fatigue of right eye and when physically fatigued the eyes are more tired and then sees black spots in front of eyes.

The optometric diagnosis revealed a typical B_2 type case with chromographs showing foci of infection. The visual graphs gave no evidence whatever of a chain of toxic interference. The symptoms were toxic (black spots) and chromography gave positive evidence of foci of infection.



Having had her eyes cared for less than one year before coming to me for diagnosis, and for other reasons which seemed sufficient at the time, Mrs. Swain deferred further ocular attention to a future date.

The latter part of September of 1935 again found Mrs. Swain in my office for optometric attention. The symptoms were much the same as before only more severe. The black spot or spots were seen all the time. Eyes fatigue easily and always right eye more tired. Back of neck and shoulders were stiff and tight, this difficulty also causing ocupital headache.

Again I found a B_2 type case, and this time in a great deal of trouble. Chromography (Mrs. Swain, Fig. 1) revealed foci of infection free from an accompanying abdominal toxemia and from drainage into the alimentary canal.

The proper lenticular prescription was given and syntonic applications instituted at once. At the end of two months of this optometric care the visual graphs were greatly improved and the symptoms practically alleviated.

The patient was referred back to Dr. Swain for dental attention and on November 22, 1935, Dr. Swain operated on his mother. His report in full is here shown.

January 6, 1936.

Dr. D. J. Mayer,
Bonnett Bldg.,
Riverside, Calif.

Dear Dr. Mayer:

I am forwarding to you a report of the dental examination of my mother, Mrs. L. C. Swain.

Clinical examination—Maxillary jaw edentulous, Mandible presented all teeth present from first bicuspids forward on each side. On the right side the second molar was also present.

Vitality tests—All teeth tested vital within a normal range with the Cameron pulp tester.

X-ray examination—Showed a residual area in region of the lower right first molar also near pulp involvement on the lower right second molar.

Recommendations—The removal of the lower right molar and the thorough curettment of the residual area in the region of the lower right first molar.

Procedure—This work was done on November 22, 1935, the areas being sterilized with phenol and alcohol following the operation.

Very truly yours,

(Signed) RAY C. SWAIN, Jr., B.D., D.D.S.

The chromographs recorded two and one-half weeks after completion of this dental work show normal graphs and a toxic free condition. (Mrs. Swain, Fig. 2.) Only after severe physical fatigue does Mrs. Swain notice any symptoms of ocular difficulty.

Conclusion

The story of chromography as insurance to both the patient and the optometrist goes on indefinitely, and as a necessity in the prevention of patch-up work, it must be included in complete optometric diagnosis.

Clinical record following clinical record is diagnosed without a chain of toxic interference; case after case is analyzed and appears to require only a lenticular prescription or a lenticular prescription and orthoptics, only to be found by chromography to require additional attention and care to actually be completed.

Because of its value in follow through work, chromography is a real aid in preventive and corrective optometry as well as the original optometric diagnosis.

The fact that chromographic evidence is based on thousands of case records of optometrists in individual practice, plus a great many thousands of case records of some of our large optometric educational clinics, it insures the practitioner facts and information upon which complete recovery can be brought about.

DR. DONALD J. MAYER
BONNETT BLDG.
3836 ORANGE ST.
RIVERSIDE, CALIF.

THE PROBLEM OF AMBLYOPIA*

R. M. Hall, A.B, B.Sc., F.A.A.O.
Cleveland, Ohio

It is not the purpose of this paper to discuss herein the terminology of this subject, in use at the present time, but to direct your attention to the various phases of investigations which have been carried on in the past; to discuss the inadequacies of the present clinical procedures and to endeavor to stimulate interest in a subject which is of fundamental importance to the therapeutics of sub-normal vision.

Until recently, the work of investigation has been based primarily upon clinical statistics and has followed three main courses, the direction of which have more or less paralleled the divisional classifications of the amblyopiae.

The first work reported was that done in the medical field dealing with those amblyopiae which are usually found and associated with general pathology and systemic disturbances, e.g., those accompanying uraemia; those of exogenous toxic origin (carbon bisulphide and tetrachloride); those due to certain drugs and poisons (quinine, methyl-alcohol, etc.); also those appearing in specific fevers or due to brain lesions. As these amblyopiae are most always associated with definite constitutional disturbances, the correction and prevention of them has progressed along medical lines. Through well established research the etiological factors underlying the majority of these conditions have been exposed and therapeutic measures instituted.

The second course of research into amblyopia began originally through analysis of clinical data and led back to the fundamental factors involved. This second phase has turned more to those amblyopiae, of traumatic or pathologic origin which have definite ocular identification, e.g., corneal scars, synechiae, cataract or positive retinal degenerations. While the work of investigation of this class has led through both medical and mechanical channels, the trend of therapeutic measures has been toward the mechanical. Especially has this been true in the last few years.

---

*An abridgment of the material presented before the American Academy of Optometry at Cleveland, Ohio, December, 1934.

The research work done with those amblyopiae of the third class, either congenital or ex-anopsia, in which there are no constitutional symptoms and in which the ophthalmoscopic findings are negative, has been dependent almost entirely upon clinical statistics. The fallacy of depending too much upon this data is easily recognizable when viewed in terms of results obtained. Within this class, which accounts for approximately 60% of all amblyopiae, lie those cases of sub-normal vision associated with strabismus, those cases in which we are primarily interested. A fair percentage of favorable results have been obtained; also, by a statistical basis, too many failures have been reported. The percentage of failure, however, is too great to be attributed solely to a probable error in therapeutic technique.

A careful study of the possible sources of error reveals immediately the lack of enough fundamental physiological knowledge to make a serious attempt at a differential diagnosis.

It has been the procedure, in the past, to rule congenital those cases of amblyopia which, according to Worth and some others, exhibit certain characteristics which are not found in other types, e.g., it is most always monocular, V.A. never less than 6/60, full field for color, the peripheral form field normal to within 20°, etc. However, other workers find congenital amblyopiae occurring most often in both eyes, V.A. usually between 6/30 and 6/60, fields reduced for color and form.

It would seem, from the contradictory evidence existing, that the differentiations of the two types (congenital and ex-anopsic) had in reality been arrived at only after therapeutic measures had been instituted and either failed or succeeded. This view may be further supported by those who have tried to get positive field findings in young squinters.

While it is true that a certain percentage of success (gained mainly through careful observation and the use of questionable differential tests) is evidence in the treatment of these cases, it is also true that a goodly amount of honest physiological research remains to be done before the underlying etiological factors can be understood and before a true basis for differential diagnosis can be established.

DR. R. M. HALL
603 SMYTHE BLDG.
CLEVELAND, OHIO

BIBLIOGRAPHY

Adler, F. H. Clinical Physiology of the Eye. 1933.

Atkinson, T. G. Oculo-Refraction, Cyclopedia and Dictionary, 1934.

Baxter, J. O. Malingering. American Journal of Optometry, 9, 7: 249. 1932.

Baxter, J. O. A Case of Toxic Amblyopia. American Journal of Optometry, 9, 8: 282. 1932.

Best, R. T. Cases of Sub-Normal Vision. American Journal of Optometry, 10, 9: 36. 193.

Burton, O. Amblyopia. The Commonwealth Optometrist (Australian), 10, 7: 266. 1928.

Duane. "Fuch's Textbook on Ophthalmology."

Feinbloom, "The Application of Telescopic Spectacles in Refraction." American Academy Year Book. 4: 74. 1930.

Feinbloom, "Report of 500 Cases of Sub-Normal Vision." American Academy Year Book. 8: 58. 1934.

Friedenwald, "Wood Alcohol Blindness with Excavation of Disc." American Journal of Ophthalmology. 259: 725. 1928.

Hall, R. M. "Non Operative Treatment of Strabismus." American Academy Year Book. 8: 34. 1934.

Hall, R. M. "Etiology and Treatment of Strabismus." American Academy Year Book. 4: 90. 1930.

Hoffman, B. T. Symptomotology of Hysteria. American Journal of Optometry. 9, 7: 242. 1932.

Jaeckle, C. E. Sub-Normal Vision—a case report. American Journal of Optometry. 10, 6: 207. 1933.

Knapp, A. Medical Ophthalmology. 1918.

Lawrence, L. "Visual Optics." 1920.

Lloyd. "Visual Field Studies."

Mansell, J. Congenital Amblyopia. The Optician. 75, 1942: 315. 1928.

Mansell, J. Snow Blindness. The Optician. 75, 1942: 316. 1928.

May, C. H. Manual of the Diseases of the Eye for Students and General Practitioners. 1934.

Neumueller, Jr. "Diagnosis and Procedure in Cases of Amblyopia."

Peckham, R. M. Squint and Heterophoria. 1931.

Pine, H. E. Amblyopic Treatment Techniques. American Journal of Optometry. 2, 6: 221. 1934.

Sheard, C. "Physiological Optics." 1928.

Smith, K. R. "Concomtent Strabismus and Heterophoria." British Journal of Ophthalmology. 12, 11: 581. 1928.

Wilkinson. "Strabismus. Its Etiology and Treatment." 1927.

Wirtschafter, Z. T. Toxic Amblyopia and Accompanying Physiological Disturbances in Carbon Tetrachloride Intoxication. American Journal of Public Health. 23, 10: 10, 35. 1933.

Worth, C. "Squint." 1921.

Zoethout. "Physiological Optics." 1927.

Amblyopia-Ex-Anopsia—Editorial and Case Report. American Journal of Optometry. 8, 4: 137. 1931.

The Cheiroscope—An Editorial and Resumme. American Journal of Optometry. 7, 7: 393. 1930.

Cases of Amblyopia—Editorial and Case Reports. American Journal of Optometry. 7, 6: 360. 1930.

Amblyopia-Ex-Anopsia in Adults—Editorial and Case Reports. American Journal of Optometry. 10, 2: 69. 1933.

Strabismus and Amblyopia—Editorial and Case Reports. American Journal of Optometry. 8, 9: 316. 1931.

DISCUSSION

DR. CARLSON: I should like to ask Dr. Hall if it has been his practice to attack the problem of amblyopia with squint by first working on the amblyopia and afterward on the squint.

My reason for the question is that it has been more or less of a rule in my office to go after the amblyopia first. If the amblyopia can be improved, even though not greatly, then I do what I can for the squint itself, and, if necessary, come back to the amblyopia. In many cases the amblyopia disappears while working on the squint.

DR. HALL: In dealing with these amblyopic squint cases I always first attack the amblyopia. While in a few cases the amblyopia disappears during the training procedure, in most cases it is apparently not greatly affected.

DR. FEINBLOOM: It seems to me that in previous meetings we have had some objection to the term "amblyopia exanopsia" because of a lack of precise definition.

In my own experience I have had many amblyopic cases whose visual acuity improved considerably under treatment showing that there was no definite pathological basis for the condition. It is these cases which I consider as exanopsic.

There is no question of the existence of a learning situation in this type of case.

I believe that a committee should be appointed by the Chairman to study this problem of nomenclature and for the formulation of acceptable amblyopic charts and methods.

DR. POSER: In this connection is it not a fact that that those who have used telescopic lenses, find that after a considerable time the patient's visual acuity without telescopes improves?

DR. FEINBLOOM: Such a development is not infrequent, especially for the reading distance, where the observations are easier. In sub-normal cases we usually need a total magnification of ten at the beginning. After a week or two we may go down to eight or less. This happens so often that we always tell the patient that after using the telescopes a while, it will be necessary to make some adjustments. It has never occurred to me, however, that the phenomenon could be explained by any change in the peripheral nervous system, as far as the eye is concerned. It is merely a case where the patient has learned certain new types of interpretation.

DR. POSER: I have had a case under observation for a number of years. She is a New York woman, a niece of one of the professors in our University, and she came to Rochester, complaining that she couldn't read and that she had been told by competent eye men that she would have to be satisfied with just groping her way about because of the deficiency in her distance visual acuity.

A telescopic magnifier was prescribed and with it the patient was able to read the larger near types and ordinary books, although the telephone directory was still beyond her.

After about a year I met her in New York and she said, "I see wonderfully, I can see much easier now than ever before, and much better than when I first used the telescopes."

There must be an improvement in the perceptive processes as the result of training and practice, as the stimulus had not changed.

DR. NEUMUELLER: We have now, in our medical school, Dr. Bielschowsky, who I have learned to admire because of his profound wisdom and tremendous experience, particularly with binocular vision anomalies.

A recent case of Dr. Beilschowsky's may be of interest in this discussion. We had a young woman referred to us whose case had been diagnosed by quite a few ophthalmologists of good standing as a typical ciliary paralysis with no amplitude of accommodation.

On a test with both eyes open the patient could not read the letters on the near point card, nor could she read when one eye at a time was occluded by a blinder.

When, however, she was told to close one eye herself she could read very well with the other. It occurs to me that a consideration of this case may be helpful in the study of the nervous system reactions involved in amblyopia.

AMERICAN JOURNAL OF OPTOMETRY

Vol. 13 JUNE, 1936 No. 6

EDITORS

DR. CAREL C. KOCH
1501 Foshay Tower
821 Marquette Avenue
Minneapolis, Minn.

DR. JACK I. KURTZ
1501 Foshay Tower
821 Marquette Avenue
Minneapolis, Minn.

Original papers, scientific communications, clinical reports, society proceedings, books for review, and correspondence should be sent to the Editor, Dr. Carel C. Koch.

Annual Subscription, $4.00 in Advance; Canada $4.50, Foreign $5.00.
Single Copies, 50c.

Copy of advertisements must be sent in by the tenth of the month preceding their appearance. Subscriptions, applications for single copies, communications with reference to advertising or other business should be addressed to the Business Manager, Dr. Jack I. Kurtz, 1501 Foshay Tower, Minneapolis, Minn.

Published Monthly by the
American Journal of Optometry Publishing Association.

The Journal has no objection to the reprinting by other magazines of any of its articles, provided such reprints are properly credited to the Amerian Journal of Optometry.

THE OPTOMETRIST'S PART IN THE PREVENTION OF BLINDNESS

From time to time persons are heard to say or to intimate that while it was very regretable, it was nevertheless true, that a certain fairly large group of our citizens were eventually to spend a fairly long portion of their lives in total darkness, and, as that seemed to be inevitable, that there was nothing else one might do except perhaps arrange our society in such fashion so as to enable these unfortunate persons to live as comfortable lives as possible, after their sight had been lost. This it seems to the writer, to be a defeatest attitude, towards the entire matter. While, to be sure, some of these unfortunate individuals will always be with us, we should study every method suggested to reduce the general total of the blind to the very minimum, and see to it that every visual safeguard is constantly at hand to prevent, in every possible way, this number from growing.

This can be done by concerted action on the part of the medical profession in general as well as the ophthalmologist, with the assistance of the safety engineer, the illuminating engineer, the employer of labor,

educators, social workers, midwives and optometrists. All of these groups come into some contact of importance with the vision of large groups of our citizens and all of these groups can play some important part in the reducing of the total number of those who through some reason or other lose their vision each year. This is not a medical problem alone. To be sure, the matter has been shunted off to the medical group in most instances, and then more or less forgotten by the rest of us, and these gentlemen have done what they could in their usual fine manner to correct mistakes after their patients had made them, but unfortunately in some cases they were called in as specialists too late, and little or nothing could be accomplished.

As I have just said, the job to be most effectual is one which calls for the concerted action of a number of professions, working together each doing its part, and when this is fully realized, and when each of these groups looks at this matter from the broad humanitarian viewpoint, then and not until then, will the progress which should be made reach its prime. But, you might ask, "How much of all this blindness that now exists would have been preventable had proper precautions been taken, and had the knowledge we now possess, been applied to these cases before they so tragically entered the ranks of the blind?"

Best[1] gives what is probably the best answer that can be given to this question. He claims that provided we had sufficient knowledge and sufficient control over sanitary conditions, the answer might be said to be —nearly all of it. But in our immediate discussion of the subject we need confine ourselves only to that blindness for which there at present exists known means of practical application. Not a few cases of threatened blindness, to begin with, from one cause or another might be warded off by timely and skilled treatment, medical or surgical. Material headway could also be made, claims Best, towards the avoidance of blindness from certain general diseases of infectious character, by the giving of proper attention. Relief may likewise be available with respect to a greater or less amount of blindness from venereal disease, which is directly responsible for a considerable portion, and indirectly for a possibly larger portion. Next, there are amendable to appropriate treatment several specific diseases of a local nature which play a great part in the destruction of the sight. They are in the main cataract, glaucoma, ophthalmia neonatorum, and trachoma. The optometrists can be of assistance here in making an early diagnosis of these conditions and refering them to medical specialists who can then do much to remedy the condition. These diseases when neglected constitute some of the leading specific causes of blindness. In large part they can be arrested, either by employment of proper measures of prophylaxis or by prompt recourse to medical or surgical relief. The ones most readily within our control are ophthalmia neonatorum and trachoma, both preventable without great difficulty. There are two other

[1] Harry Best. Blindness and the Blind in the United States. The Macmillan Company, New York City. 1934.

notable eye disorders namely, keratitis and conjunctivis, damage from which may be avoided by comparatively simple precautions. Much may also be said to be possible in the way of prevention with respect to such complaints as atrophy of the optic nerve, ulceration of the cornea, certain forms of retinitis, etc. After these diseases there come sundry accidents and injuries to the eye of external character, including eyestrain, very many of which are preventable by the exercise of sufficient care or by the employment of proper safeguards. Here too the optometrist plays an important part. Finally with respect to the large amount of blindness which is a concomitant or result of old age, or with respect to the smaller amount which arises from apparently unavoidable diseases, there would be a substantial lessening, claims Best, if surroundings and modes of life, or general health conditions, were in all cases improved. Such in the main are the causes of blindness of which to a greater or less extent we now seem able to gain control, or which we seem most sure of being able to arrest. Others may in part be found in some measure susceptible of prevention, though the necessary means are not so well recognized, or, are at present not so available.

To state the exact proportion of blindness that is preventable would be a difficult matter, but considering the causes already enumerated, we may, according to Best, form an approximation, which need not be far astray. According to him, we may set down as preventable all cases of ophthalmia neonatorum and trachoma (with most of the cases of "sore eyes"), or about 6 per cent of the total causes of blindness; three-fourths of the remaining specific affections of the eye (together with "neuralgia"), and of the definite affections of the eye diseases, or 38 per cent of the total; four-fifths of the cases of external injuries (including strained eyes, poisoning, foreign substances in the eye, and exposure to heat), or 17 per cent of the total; and one-half of the cases designated as indefinite and unknown (not including "sore eyes," "neuralgia," and strained eyes), or 11 per cent of the total. Thus Best finds that what seems to be a fair estimate or 72 per cent, or not far from three-fourths of the blindness in the United States seems to be of preventable character if handled properly.

From diseases affecting the eye in one way or another there results, according to Best's findings, some three-fourths of all blindness. As had already been indicated, a very large portion of affections of the eye may be said to have their basis or origin in diseases of a more general nature. No small part is attributable to disorders of the digestive, circulatory, nervous, or other system of the human body, as well as to disorders of more particular character—besides the results of unhygienic living in general. So far as these have an effect upon the eyesight, their subjugation or mitigation will have notable manifestation in the reduction of blindness, or in its incidence being minimized.

In particular, claims Best, with better dealing with general inflammatory diseases, diseases of the digestive system, and diseases on the order of rheumatism, there would be an immediate and heavy reduction of

various forms of blindness. In a large part infectious diseases are responsible for blindness belong to infancy and early years of life, some being more or less common diseases of childhood. They include meningitis, scarlet fever, measles, mumps, typhoid fever, tuberculosis, and similiar affections. Other infectious diseases of venereal nature, have an extended influence upon the organs of vision. The larger number of such affections are in most individual cases amendable to treatment, continues Best, with the resultant saving of sight, if taken in hand at an early state; while by proper medical control in all instances, including where necessary due isolation, there can at least be accomplished a checking of their spread. In the control of meningitis in particular, with its consequences, no small gain is to be expected. Much betterment is similarly to be had in the intense and prolonged treatment of congenital syphilis. Sympathetic ophthalmia resulting from wounds, with possibly sympathetic inflammation and eventual loss of the uninjured eye, may sometimes be avoided by suitable measures.

With certain of the leading specific diseases of the eye, notably cataract and glaucoma there is in the affording of due and seasonable treatment occasion for very much preventive work, perhaps much more than is generally realized. Such affections are, claims Best, in no small degree related to more general systemic disorders, and may be diminished to the extent that the latter are brought under control. Cataract, too, Best asserts, might be greatly reduced through the avoidance of certain disorders or injuries, whether local or general, by means of which it is induced or precipitated. Diminution is likewise possible to a considerable extent with glaucoma, which is affected in no small measure by such influences as lack of rest, improper diet, impure blood, etc. In the early stages in particular it may be helped by proper treatment, possibly including operations, but here to be effective an early diagnosis is imperative and at this point the optometrist can be of assistance.

There are also, continues Best, several specific diseases of a highly contagious character, often appearing in the years of childhood and youth, which have a peculiar bearing upon the eyesight, and in respect to which there are manifest possibilities of prevention. These are in the main ophthalmia neonatorum, trachoma, conjunctivitis, and keratitis, all largely surface inflammations of the eye. The first two require rather detailed attention. Conjunctivitis, an inflammation of the conjunctiva, possibly a consequent of unwholesome living conditions, including the sequelae of various infectious diseases, is generally to be avoided by the use of clean towels, handkerchiefs, etc. Keratitis is of two principal forms, both affections of the cornea, and often resulting from systemic depleting conditions. Phlytenular keratitis, most likely of tubercular origin, and frequently with the characteristics of scrofula or eczema, is according to Best, a consequence largely of bad housing and poor nutrition, its prevention depends in large measure upon the establishment of wholesome sanitary surroundings, and upon the general treatment for tuber-

culosis. Interstitial keratitis is due in most cases to syphilis, and in a few to tuberculosis.

With respect to certain other diseases causing blindness there is no small field in the way of prevention or mitigation. Artophy of the optic nerve owes much to toxic actions in the system. Opacities of the cornea are often due to the after effects of inflammatory diseases, perhaps themselves of brief duration, which leave some portion of the cornea clouded. Corneal ulceration, certain forms of retinitis, and other affections of the eye may in not a few instances be helped.

Finally, even with those diseases chargeable with blindness the possibilities of the prevention of which are not so apparent including those involving the deeper structure of the eye, there can be little doubt that considerable gain might generally be effected in the early employment of fitting medical and surgical measures. This type of problem is largely in the hands of medical science, and for the present the most we can do is to wait upon its developments in the study both of the prevention of disease and of its treatment. At the same time, an immediately practical program lies in the better safeguarding of the diminution of blindness. Of paramount importance in all cases is the examination of the eyes in the early years of life, with its periodical examination thereafter.

Now where does the optometrist enter this problem and what can he be expected to do to assist in reducing the number of persons who annually lose their sight? He plays, in my opinion, a part of some importance in dealing with the matter of blindness as by his very position he is the "first port of call" for many and many an individual when he or she begins to notice that something has gone amiss with their eyes. To be sure, most of the optometrist's patients are suffering from some simple uncorrected refractive defect such as a slight hyperopia or a hyperopic astigmia or perhaps a presbyopic condition of some sort. These folks are for the most part in no danger of going blind and merely need a thorough refraction and suitably fitted glasses to return them to visual normal. However, there also comes to the optometrist at times persons who are experiencing the initial symptoms of visual disorders which may, if ignored, eventually lead to more serious conditions and even to blindness if not properly handled. It is at this point that the optometrist's diagnostic skill is called into play. Through his refractive and diagnostic skill it becomes his privilege and duty to weed out these individuals whose condition is such as to call for medical aid, and by means of his ophthalmoscopic work, his perimetric and color field analysis, his work in the fields of neuro-innervational problems of vision and his refractive work itself, he is in a position to accomplish this very vital and important public service. It would be well, however, if each of the professional groups interested in this matter would have a better working relationship with the other of the groups as only by a more complete coordination of all of those interested in the problem will come the best results.

Carel C. Koch.

SPECIAL REPORT

THE OPTOMETRIC RESEARCH INSTITUTE OF MICHIGAN TO CONCENTRATE ON THE INVESTIGATION OF THE RELATION OF VISION TO SCHOLARSHIP*

R. M. Peckham, Opt.D.
Detroit, Mich.

The Third Annual Meeting of the shareholders of The Optometric Research Institute of Michigan was held May 4th in the offices of the corporation in Detroit.

The President, Dr. Ewing Adams, reviewed the work of The Institute during the past two years, citing in particular the research in the problem of unequal retinal images and the practical solution developed at The Institute; the experimental work in Orthoptic Training which has resulted in establishing a solid foundation principle built on a factual basis; and the investigation as to the relation of scholarship and vision in the survey of 10,000 school children in the City of Detroit.

The report showed an investment of $10,145 for equipment now in the offices of The Institute. Operating costs for the past two years were $14,556, mainly spent in research work. Total disbursements for the two years were $24,701, most of which was raised by voluntary contributions of the Optometrists of Michigan. There are now 144 members.

Because of the value to all Optometrists of the information collected at The Institute in the study of Problem Cases, Amblyopia and Strabismus, on the recommendation of the Board of Governors the shareholders voted to amend that article of the Charter which has restricted membership to Optometrists registered in the State of Michigan in order to open membership and the facilities for instruction to all Optometrists of the United States and Canada.

Recognizing the paramount importance of the study of the relation of vision to scholarship as shown by the data already collected, the shareholders voted to reorganize the financing plans of The Institute and to increase the endowment so that this investigation may be carried further and voted that the Board of Governors arrange that the time and energies of the Director of Research be concentrated on the supervision of this research.

The shareholders voted to enlarge the Board of Governors from five to seven members, with the creation of a Special Finance Committee within the Board to assume charge of all receipts and disbursements.

The following Board of Governors and Officials were elected for

*Submitted for publication May 25, 1936.

the ensuing year: President, Ewing Adams; Vice-president, Charles Van Sluyters; Secretary, Cecil O. Sarber; Treasurer, Maurice D. Benyas; Finance Committee, Peter A. Sanders (chairman), Glyndon D. Rowe, Bert W. Stratton.

DR. R. M. PECKHAM
202 STATE THEATRE BLDG.
DETROIT, MICH.

* * * * *

BOOK NOTICES

THE EXTRA-OCULAR MUSCLES. Luther C. Peter, M.D. Second Edition. Published by Lea & Febiger, Washington Square, Philadelphia, Pa. 351 pages, 136 illustrations, 5 colored plates. Cloth $4.50 —1936.

This is the second edition of Peter's work dealing with the extra-ocular muscles. Practically all of the original material is included and some new material has been added at the ends of certain sections. This volume is very complete and fully covers the basic fundamentals of the subject. One can truly say that Peters writes as well about the extrinsic ocular muscles in this monograph as he did in the several editions of his now well known work on Primetry, which has become practically a classic in that field.

This book is divided into six parts as follows: Part one which deals with the anatomy of the six extra ocular muscles first and next and then gives a very complete review of the physiological action of these muscles in conjunction with all ocular functions. This section is very complete and serves as a foundation for the other sections which follow. Part two deals with the phorias and their interpretations. Here the author brings into the subject the effect of proper diet on the action of the extrinsic ocular muscles and also has much to say on the matter of orthoptic treatment work. Part three deals with non-paralytic squints and their correction by non-surgical means, while Part four deals with paralytic squint. Both of these sections are written with a modern view-point of the subject and contain much of value to all refractionists. Part five deals with the surgical phases of this work in the field of squint correction while Part six, a short section of only some ten pages, deals with the subject of nystagmus. Peters writes very clearly and this work on the extra-ocular muscles is a thorough, understandable text of real value.

C. C. K.

ABSTRACTS

THE EQUALIZATION OF RETINAL IMAGE SIZES. W. B. Barker. The Optician. Vol. XC, No. 2340, p. 437. 1936.

Barker claims that the importance of any disparity in retinal image sizes would be more accurately realized if considered in its relationship to the generally accepted theories as to the causation of muscular imbalance. These causations are generally agreed to be, (a) Anatomical defect, (b) Physiological defect, (c) Ocular Asymmetry of various forms, (d) Aniseikonia.

Barker also feels that in a case of aniseikonia in which this condition is left uncorrected it is obvious there is difficulty of appeal to the fusion faculty in such cases, as one image must be disturbing, and therefore the brain would desire its rejection. He therefore feels that this was one of the prime causes of amblyopia, with or with out an accompanying squint, both the induced suppression and the displacement of the disturbing image being the result of a mental desire to eliminate the disturbing image with an abandonment of appeal to the fusion faculty and stereoscopic vision.

Admitting that much further research was still necessary before finality could be reached, sufficient progress had already been made to enable optometrists to apply an improved technique in dealing with such cases and giving their patient more skillful treatment and greater comfort and satisfaction. This seemed to be all the more desirable because it had been recorded that—

(a) 1% differences in retinal image sizes could cause discomfort.

(b) 2% differences in retinal image sizes would be distinctly disturbing.

(c) 4% differences in retinal image sizes and over would be responsible for suppression in one eye, resulting in amblyopia and a squint that presented some stubborn response to prevalent methods of treatment.

Barker next reviews the work of Ames and Gliddon in this field of aniseikonia, and then describes an instrument he has devised to measure the size of ocular images. This instrument consists of two parallel tubes, 25 cm. long, glazed at one end with +4.0 D. spherical lenses and capable of separation for varying inter-pupilary widths. This ensured that both convergence and accommodation would be as for infinity when a patient looked at targets fixed at the forward ends of the tubes. These targets take the form of luminous mires—one being a circle of 25 mm. radius with its vertical diameter, the second being a mechanical target, consisting of a vertical line, capable of extension with arcuate "T" extensions at each end. Rotary prisms were also fitted behind the spherical lenses, so as to be effective either vertically or laterally.

Next, the patient, first having all of his or her refractive error corrected by means of lenses, views these mires through the two tubes and

sees the circle (tinted green for discrimination) with one eye, and the vertical variable line (in white) with the other eye. By suitable adjustment of the rotary prisms, the vertical lines were brought almost in opposition and first of all if any cyclophoria was present, this was corrected and measured by rotating the targets. The coincidence of the two vertical lines was then secured by further adjustments of the prisms with equal overlap above and below the circle of the white "T" pieces. The mechanical mire was then adjusted until the white target image with its projecting "T" pieces had entirely disappeared into and was fused with the green circle image. Under these conditions, the retinal images were equalized in size and the difference factor read off on the scale of the mechanical target as a percentage difference.

The next step is of course to correct the difference in the size of the two retinal images and Barker claims that this can be done in one of two ways, (a) utilizing thickness or iseikonic lenses as has been suggested by Ames and Gliddon or (b) varying the position of the vertex plane of toroidal lenses so that this was placed nearer to or further from the patient's cornea. C. C. K.

* * * * *

SOME SIMPLE CORRECTIONS IN SUB-NORMAL VISION. G. Henry Aronsfeld. The Canadian Optometrist. Vol. 18, No. 2, p. 42. 1936.

Several case reports are given by Aronsfeld in this paper. These deal with cases of sub-normal vision due to incipient cataract, post-operative scars resulting in sub-normal vision, fundus disorders resulting from retinal hemorrhages, choroiditis and optic atrophy and the visual assistance he was able to render these patients through the medium of prescribing strong monocular plus additions for part time use of the better eye for reading. The additions used were +7.00 to +8.00 diopters which of course made it necessary for the patient to hold the reading from six to four inches before the seeing eye, but as no other correction would enable the patients to read at all, Aronsfeld felt justified in giving such corrections to these patients, instructing them at the same time to use them but sparingly. C. C. K.

* * * * *

AMBLYOPIA—A CASE REPORT. Edward Widdell. The Mid-West Optometric Journal. Vol. 3, No. 5, p. 9. 1936.

Widdell reports a case of a boy age 8, whose visual acuity was 20/100. His health was normal and the ophthalmoscopic examination revealed nothing of interest. Upon refracting this case the examination indicated a slight amount of hyperopia but lenses in no way improved vision. After studying the case for some time Widdell resorted to retinal stimulation and the use of the myo-fusion technique with the squint corrector. Two months of this therapy increased the uncorrected visual acuity to 20/30 O. U. C. C. K.

TITMUS

PERFEX LENSES

FAMOUS THROUGHOUT THE PROFESSION FOR

QUALITY

From every branch of the Profession comes commendation of the uniform quality and precision of Titmus ophthalmic lenses. Doctor, fitter and optical technician share with the patient the fruits of manufacturing care and accuracy.

The Titmus Optical Company, Inc.

Independent Manufacturers of Perfect Quality Ophthalmic Lenses

PETERSBURG, VIRGINIA, U. S. A.

HOW WELL DO YOU KNOW MODERN BIFOCAL PRACTICE ?

Solution to problem on page VII

Mr. Jones has been a confirmed "one pairer" though his outdoor activity would seem to indicate a second pair of bifocals. Fortunately, in reading and in his other avocation of home craftsmanship, bodily carriage is such that the segments should be placed low. Consequently, one pair of bifocals, Panoptik Soft-Lite No. 1, is the ideal prescription. For fishing, driving, and other outdoor activities, the Soft-Lite affords just the needed amount of protection from glare; and for indoor activities is most comfortable.

The Panoptik segment, located 4 mm below, places the geometric segment center at 7.5 millimeters down to meet the requirement of near vision through a point 7.5 to 8 mm down. The optical center of the reading part in this Rx also falls at the nearby point of 8.5 mm below, making the bifocal ideal. Jump of image and apparent displacement of objects are minimized; the segment is low enough to permit ample distance field, and because of segment shape, encroaches little on the distance field. For reading, the full width of the segment is located strategically.

Panoptiks will prove to be easy for this patient to "get used to." *"In Soft-Lite, too."*

PRESCRIBE AND FIT
BAUSCH & LOMB PANOPTIKS

Have You Moved?

Send us
Your New Address,
In Order That
You May Receive
Your
Journal
Regularly.

American Journal of Optometry